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The use of adenosine stress perfusion cardiac magnetic resonance in determining incomplete revascularization post-coronary artery bypass grafting and the importance of anterior septal vessels

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Summary

Incomplete revascularization post-coronary artery bypass grafting (CABG) may occur in up to one quarter of patients,[1] and meta-analyses suggest this is associated with poor outcomes.[1,2] ESC guidelines now prioritize complete revascularization when deciding between CABG or percutaneous coronary intervention (PCI).[3] Adenosine stress perfusion cardiac magnetic resonance (MR) is well suited to determine the burden and location of ischaemia over and above scar, which may guide further revascularization after CABG. In our magnetic resonance experience, patients may receive bypass grafts that inadvertently leave proximal branches of the main coronary arteries trapped between a distal bypassed stenosis, and a proximal native stenosis.

Case description

A 60-year-old gentleman presented with persistent angina post-CABG prompting investigation with adenosine stress cardiac MR. This confirmed subendocardial ischaemia involving the anterior wall and septum (*Figure 1*). The prior operative plan was to graft the left anterior descending artery (LAD), diagonal, and circumflex. On review of the operative record, it was noted that the diagonal was found to be too small to graft intraoperatively. Proximal and mid-vessel native LAD disease precluded antegrade native flow or retrograde flow from the left internal mammary artery (LIMA) to the trapped septals and diagonal (*Figure 2*). Percutaneous coronary intervention to the proximal LAD and diagonal rendered the patient asymptomatic with maintenance of good LIMA flow to the distal LAD. Of note, anterior septal ischaemia affects two-thirds of the septum as shown in *Figure 1*. Thus, even without diagonal involvement the trapped septal vessels would cause >10% ischaemia warranting further revascularization.[3]

This case highlights the importance of assessing the likelihood of achieving complete revascularization based on the planned grafts, reviewing the operative result, and considering an upfront hybrid graft-PCI approach and/or functional assessment of success following revascularization. It also illustrates the functional significance of often overlooked anterior septal vessels.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

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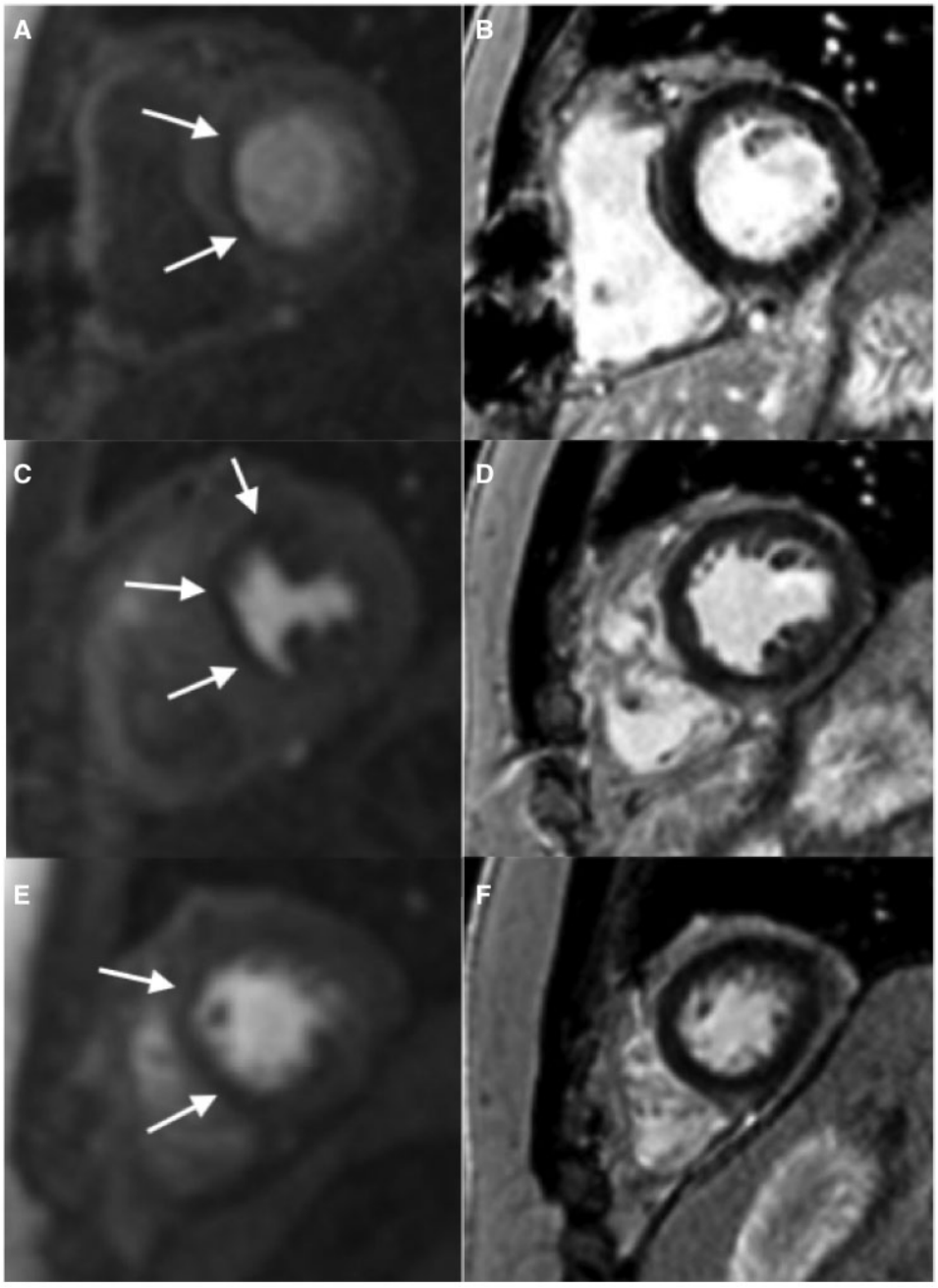

Figure 1 (*A*, *C*, *E*) Perfusion defect delineated by white arrows in short-axis slices: (*A*) basal, (*C*) mid, and (*E*) apical. (*B*, *D*, *F*) Corresponding absence of late gadolinium enhancement during phase sensitive inversion recovery sequences.

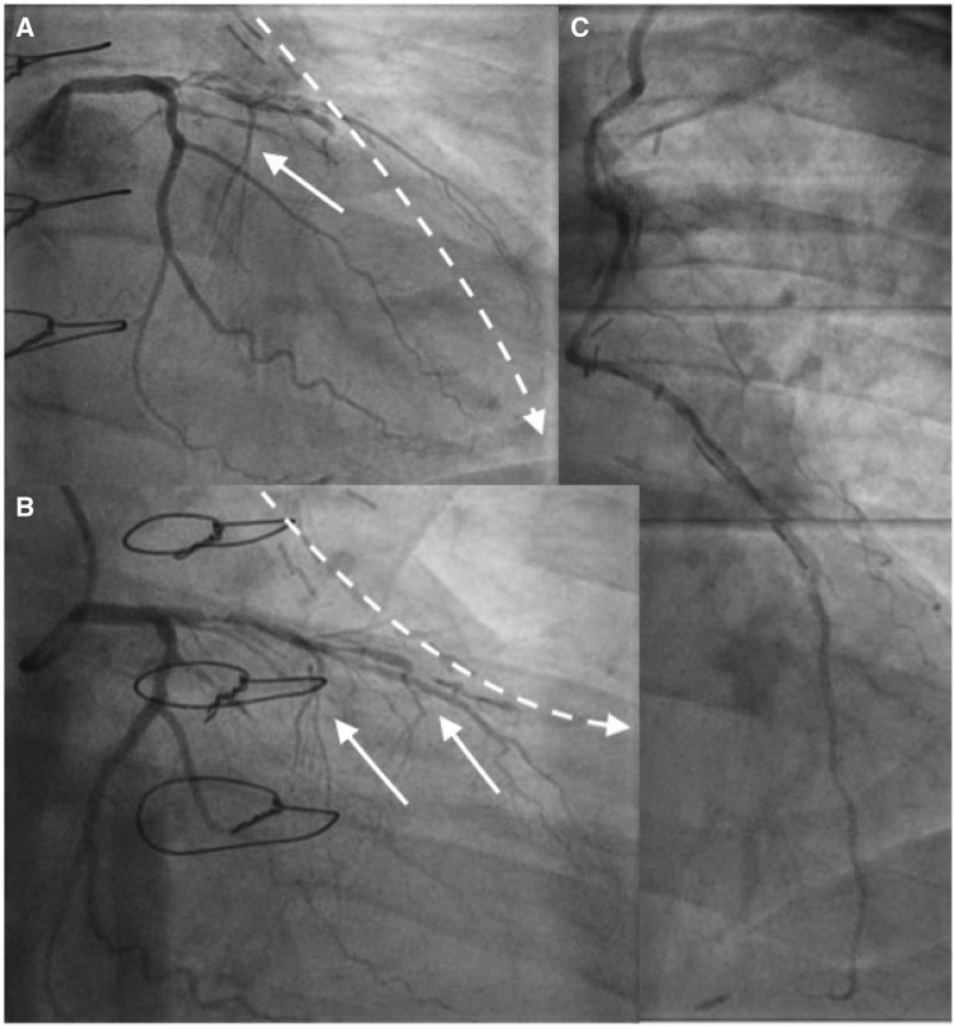

Figure 2 (*A*, *B*) Angiographic demonstration of trapped septal and diagonal vessels (white arrows) due to proximal and mid-left anterior descending artery stenosis. Course of LIMA to LAD outlined by dashed arrow. (*C*) Angiographic view of LIMA to LAD showing lack of retrograde flow to the trapped vessels.

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